

## CLAIMS

What is claimed is:

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1. A mammalian sperm flagellar energy carrier protein, or a homolog, derivative, or fragment thereof, wherein said protein comprises the amino acid sequence SEQ ID NO:2 or SEQ ID NO:4, or a homolog, derivative, or fragment thereof.

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2. The sperm flagellar energy carrier protein of claim 1, wherein said protein is localized to the principal piece of the sperm flagellum.

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3. The sperm flagellar energy carrier protein of claim 1, wherein said protein comprises the amino acid sequence SEQ ID NO:2 or an amino acid sequence substantially similar to SEQ ID NO:2.

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4. The sperm flagellar energy carrier protein of claim 1, wherein said protein is an adenine nucleotide translocase.

5. A pharmaceutical composition comprising the sperm flagellar energy carrier protein of claim 1 and a pharmaceutically-acceptable carrier.

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6. An isolated nucleic acid comprising a nucleic acid sequence, or a homolog, derivative, or fragment thereof, encoding a sperm flagellar energy carrier protein, or a homolog, derivative, or fragment thereof.

7. A vector comprising the isolated nucleic acid of claim 6.

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8. The vector of claim 7, said vector further comprising a nucleic acid specifying a promoter/regulatory sequence operably linked thereto.

9. A host cell comprising the vector of claim 7.

10. The host cell of claim 9, wherein said cell is a mammalian cell.
11. A host cell comprising the vector of claim 8.
- 5 12. The host cell of claim 11, wherein said cell is a mammalian cell.
13. The isolated nucleic acid of claim 6, wherein said isolated nucleic acid comprises a nucleic acid having the sequence SEQ ID NO:1 or NO:3, or a sequence substantially similar to SEQ ID NO:1 or SEQ ID NO:3.
- 10 14. The isolated nucleic acid of claim 6, wherein said isolated nucleic acid comprises a nucleic acid sequence encoding an SFEC protein comprising SEQ ID NO:2 or SEQ ID NO:4.
- 15 15. A composition comprising an isolated nucleic acid complementary to an isolated nucleic acid encoding a sperm flagellar energy carrier protein, or a homolog, derivative, or fragment thereof, and a pharmaceutically-acceptable carrier.
- 20 16. An antibody that specifically binds to a sperm flagellar energy carrier protein, or a homolog, derivative, or fragment thereof.
- 25 17. The antibody of claim 6, wherein the antibody specifically binds to a sperm flagellar energy carrier protein comprising the amino acid sequence SEQ ID NO: 2, or a homolog, derivative, or fragment thereof.
- 30 18. The antibody of claim 17, wherein said antibody is a monoclonal antibody.
19. A pharmaceutical composition comprising the antibody of claim 16 and a pharmaceutically acceptable carrier.
20. An antigenic composition comprising a protein having the amino acid sequence SEQ ID NO: 2, or an antigenic homolog, derivative, or fragment thereof, and a pharmaceutically-acceptable carrier.
- 35 21. The composition of claim 20, further comprising an adjuvant.

22. A method of diagnosing a sperm flagellar energy carrier protein-associated disease or disorder related to aberrant sperm flagellar energy carrier protein expression, function, or levels, said method comprising obtaining a sample from a subject, measuring sperm flagellar energy carrier protein expression, function, or levels in said sample, wherein different amounts of sperm flagellar energy carrier protein expression, function, or levels in the sample relative to the amounts of sperm flagellar energy carrier protein expression, function, or levels in a sample from a control subject not having the sperm flagellar energy carrier protein-associated disease or disorder, indicates the presence of the sperm flagellar energy carrier protein-associated disease or disorder.

23. A method of treating a sperm flagellar energy carrier protein-associated disease or disorder in a subject in need of such treatment, comprising administering to the subject an effective amount of a composition comprising at least one isolated nucleic acid comprising a nucleic acid sequence encoding a sperm flagellar energy carrier protein, or a biologically active homolog, derivative, or fragment of said sperm flagellar energy carrier protein, and a pharmaceutically-acceptable carrier.

24. A method of treating a sperm flagellar energy carrier protein-associated disease or disorder in a subject in need of such treatment, comprising administering to the subject an effective amount of a composition comprising at least one regulator of sperm flagellar energy carrier protein expression, function, or levels, and a pharmaceutically-acceptable carrier.

25. A method of regulating sperm flagellar energy carrier protein expression, function, or levels in a subject, said method comprising administering to the subject an effective amount of a composition comprising at least one regulator of sperm flagellar energy carrier protein expression, function, or levels, and a pharmaceutically-acceptable carrier.

26. The method of claim 25, wherein said regulator of sperm flagellar energy carrier protein expression, function, or levels is an inhibitor of sperm flagellar energy carrier protein expression, function, or levels.

27. The method of claim 26, wherein said regulator is an antibody.

28. A kit for treating a sperm flagellar energy carrier protein-associated disease or disorder in a subject, said kit comprising a sperm flagellar energy carrier protein expression, function, or level regulating amount of a composition comprising a regulator of sperm flagellar energy carrier protein, and a pharmaceutically-acceptable carrier, said kit further comprising an applicator, and an instructional material for the use thereof.

29. A kit for regulating sperm flagellar energy carrier protein expression, function or levels, said kit comprising a sperm flagellar energy carrier protein regulating amount of a composition comprising a regulator of sperm flagellar energy carrier protein expression, function, or levels and a pharmaceutically-acceptable carrier, said kit further comprising an applicator, and an instructional material for the use thereof.

30. The kit of claim 29, wherein said regulator of sperm flagellar energy carrier protein expression, function, or levels inhibits sperm flagellar energy carrier protein expression, function, or levels.

31. The kit of claim 30, wherein said regulator is an antibody.

32. A method of identifying an inhibitor of sperm flagellar energy carrier protein expression, function, or levels in a cell, said method comprising contacting a cell with a test compound, measuring sperm flagellar energy carrier protein expression, function, or levels in said cell, wherein lower levels of sperm flagellar energy carrier protein expression, function, or levels in said cell, compared with sperm flagellar energy carrier protein expression, function, or levels in an otherwise identical cell not contacted with said test compound, is an indication that said test compound is an inhibitor of sperm flagellar energy carrier protein expression, function, or levels in a cell.

33. The method of claim 32, wherein said cell is a human cell.

34. The method of claim 32, wherein said inhibitor is an antibody.

35. The method of claim 34, wherein said antibody is directed against a sperm flagellar energy carrier protein, or a homolog, derivative, or fragment thereof, having the sequence SEQ ID NO:2, or a sequence substantially similar to SEQ ID NO:2.

36. The method of claim 32, wherein said method identifies a compound which inhibits sperm flagellar energy carrier protein adenine nucleotide translocase function.

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37. A compound identified by the method of claim 32.